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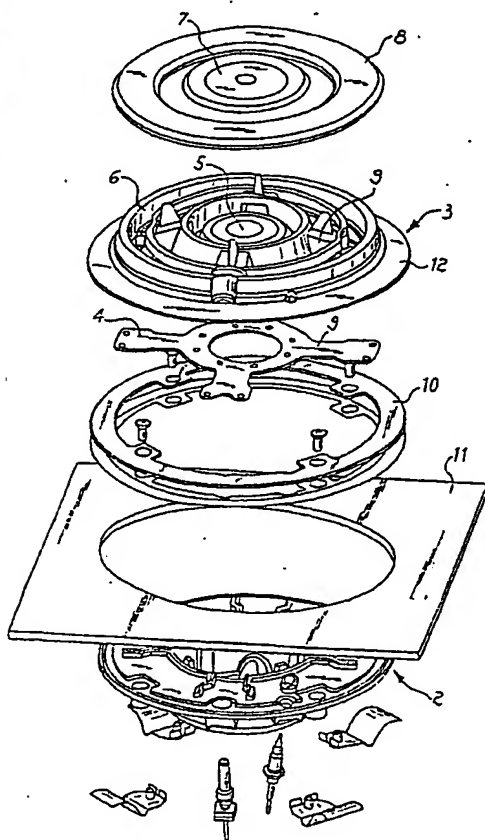
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(54) Title: **BURNER WITH INTERNAL SEPARATOR**



(57) Abstract: The invention relates to a burner (1) for cookers, suitable for burning gas, comprising at least two gas crowns, of which one central one and at least one circumferential one, a mixing chamber (13) with Venturi effect, ducts for entry of the primary air and radial ducts (9) for feeding the gas/primary air mixture to the said at least one circumferential crown, comprising a body (3), a head (2) and a separation element (4) that breaks up the internal space into ducts for entry of the primary air and ducts for distribution of the gas/primary air mixture.

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"Burner with internal separator"**Technical Field**

The present invention relates to a burner for cookers equipped with two or more gas crowns, more in particular a burner suitable for use in built-in cooking surfaces.

Background Art

There are known burners for cookers provided with two or three gas crowns, in particular burners with three crowns, a central one and two outer ones, one facing the inside and one facing the outside of the burner.

This type of burner enables uniform heating of the pans that are set on them irrespective of the shape and size of the pans.

In the European patent application EP 0 797 048 in the name of the present applicant, a burner with three gas crowns is described which is provided with a horizontal Venturi made in a chamber formed between a base of the burner and an upper portion comprising the central gas crown. The chamber of the Venturi communicates with an upper chamber defined by the bottom of the area of central crown and by the central burner cap. This burner is substantially formed by three die-cast pieces which are then assembled together.

In the European patent application 0 903 538 in the name of the present applicant, an improved burner is described, which likewise has the characteristic of comprising three concentric gas crowns and means for feeding the gas/primary air mixture to said crowns. The said burner is made up of just two die-cast pieces, and the chamber with Venturi effect, which is substantially horizontal, is defined by the surfaces set facing one another, one of which corresponding to the body of the burner and the other to the cap of the central gas crown. Notwithstanding the advantage of being made up of just two die-cast

pieces, this burner presents, however, certain drawbacks; in particular, using just two die-cast pieces it is not possible to make, inside the burner, all the ducts necessary for the passage of the primary air and of the gas/primary air mixture. In fact, in this burner, the ducts that
5 carry the gas/primary air mixture from the mixing chamber to the circumferential crowns are not altogether made in the body of the burner, but are defined by ducts delimited at the top only by planar appendages that join the central cap to the annular burner cap, a solution which is not ideal given the consequent inevitable leakages of
10 mixture and the possibility of undesired displacements of said burner caps.

Disclosure of Invention

The purpose of the present invention is to overcome the drawbacks presented by the burners described above by providing a burner
15 made up of just two die-cast pieces and equipped with the ducts for distributing the gas/primary air mixture from the mixing chamber to the circumferential crowns made inside the burner itself.

According to one aspect, the invention relates to a burner for built-in cookers, suitable for burning gas, comprising two or more gas crowns,
20 of which one central one and at least one circumferential one, comprising a body and a head separated by a substantially flat element which breaks up the internal space into ducts for entry of the primary air and into ducts for the distribution of the gas/primary air mixture.

25 According to a main aspect, the invention thus relates to a burner as described in Claim 1.

In particular, the invention relates to a burner for cookers, suitable for burning gas, comprising at least two gas crowns, of which a central one and at least one circumferential one, a central mixing chamber

with Venturi effect, ducts for entry of the primary air, and radial ducts for feeding the gas/primary air mixture to the said at least one circumferential crown, characterized in that it comprises a body, a head, and a substantially flat internal element of separation designed to define the upper surfaces of said ducts for entry of the primary air and the lower surfaces of said radial ducts.

Preferred features of the burner of the invention are described in the dependent claims.

The invention will now be described in greater detail with particular reference to the attached figures exclusively by way of illustrative example.

Brief Description of Drawings

Figure 1 is an exploded view of a burner according to the invention.

Figure 2 is a view of the burner from above.

Figure 3 is a view of the burner from below.

Figure 4 is the section A-A of Figure 2.

Figure 4a is a schematic view of one half of the burner illustrated in Figure 4.

Figure 5 is a detail of the section C-C of Figure 4a.

Figure 6 is the section B-B of Figure 2; and

Figure 7 is a sectional view of a burner according to another embodiment of the present invention.

Best mode for carrying out the invention

With reference to Figure 1, a burner 1 according to the invention is shown which comprises a body 2, a head 3 and an interposed flat element 4; in the specific embodiment the interposed flat element 4 is shaped like a Celtic cross. Visible in the top portion of the head 3 are the central chamber 5 and the annular chamber 6 with the respective (central and circumferential) gas crowns which are covered with

respective caps 7 and 8. The central chamber is connected to the annular chamber 6 by means of the radial ducts 9, the top and side walls of which are defined in the head 2, and the bottom walls of which are defined by the upper surface of the flat element 4, which is joined to the head 2 by means of screws or studs deformed by upsetting (studs being preferred). A possible skirt 12 protects the slits designed for the entry of primary air; in some embodiments this skirt may not be present, or alternatively it may be joined to the flat element 4. A seal element 10 may be present for recessing of the burner into pyroceram hobs. Recessing of the burner in the surface 11 is obtained by using conventional means, and appropriate optional elements may be used for recessing.

With reference to Figure 2, the arrangement of the concentric gas crowns with the respective caps 7 and 8 is shown.

Figure 3 shows a view from below of the burner and illustrates the feed of the gas by means of the duct 15.

Figure 4 shows the internal conformation of the body and of the head of the burner, in particular the feed duct 15, the nozzle 16 in the body 2, and the structure of the Venturi channel 13, 13a, of the possible skirt 12 and of blocking elements 17 for blocking the caps on the head 3.

Figure 4a shows schematically, and for just one half, the diametral section of the burner of Figure 2. In particular it may be noted that, in the body 2, there are ribs 18 which engage with complementary ribs 19 located on the head 3. The ribs 18 and 19, which are joined together when the burner is assembled, define channels communicating with the outside. The flat element 4 divides in the horizontal direction said channels into two, so breaking up the internal space and giving rise, at the bottom, to the ducts for entry of the primary air and, at the top, to the radial ducts 9 for distribution of the

gas/primary air mixture to the annular chamber 14. The arrows indicate the path of the air at entry and after mixing with the gas that comes from the nozzle 16.

With reference to Figure 5, it may be noted how the element 4 acts as
5 internal separator defining two cavities, one for entry of the primary air indicated by the reference I and the other for the exit of the gas/primary air mixture in the annular chamber indicated by the reference M; also clearly visible in Figure 5 are the ribs 18 and 19 and the ducts that they define.

10 With reference to Figure 6, the parts making up the inside of the burner shown according to a different section are visible.

For operation of the burner, and again with reference to the specific technical solution illustrated in the figures, the primary air that penetrates through the slits made under the possible skirt 12 as
15 indicated by the arrows is sucked into the Venturi channel 13, 13a, where it is mixed with the gas coming from the duct 5 and introduced by means of the nozzle 16. The gas/primary air mixture then ascends along the vertical and horizontal Venturi channel to reach the central crown underneath the central cap 7; from here, traversing the radial
20 channels, as indicated by the arrows in Figure 4a, it reaches the annular chamber 14 and the overlying crowns.

As has been said, the body and the head are preferably die-cast as in conventional burners.

The internal element 4 is preferably made of a piece of steel sheet
25 and may assume different shapes, according to the conformation of the body and head of the burner. According to an advantageous feature, the element 4 is shaped like a Celtic cross to define four internal ducts and a circular area of separation of the internal space adjacent to the Venturi channel.

As has been seen previously, the element 4 may alternatively be made of a single piece with the skirt.

According to a preferred aspect, the central chamber, which prevalently has a horizontal Venturi effect, is defined by the surfaces set facing one another, one of which corresponds to the body of the burner and the other to the cap of the central gas crown.

The gas crowns of the burner may assume different conformations; according to a preferred embodiment, however, the gas crown is obtained by means of holes positioned on the upper edge of the external walls of the central chamber.

As clearly described later with reference to figure 7, the flame holes 201 of the central flame crown are tilted with respect to the vertical axis Y of the burner at an angle β of between 40 and 70 degrees. The tilt of the flame holes 201 was found to be particular efficient in order to obtain stable flames and uniform distribution of the heat over the burner.

Advantageously, the circumferential gas crowns are two in number and have notches on the internal and external edges of the annular chamber as described, for example, in the European patent application 0 903 538 in the name of the present applicant.

The caps 7 and 8 and/or the skirt 12, which is possibly present, may be made of different materials, for example steel or brass, and may, moreover, be enamelled in various chromatic shades according to the different ornamental requirements.

Thanks to the specific internal conformation, and in particular to the separation element 4 set between the two die-cast pieces 2 and 3, the burner of the invention represents a clear improvement with respect to known burners, overcoming the problems that these present and enabling production at contained costs.

EXAMPLE

With reference now to figure 7, showing an example of embodiment of the present invention, the burner body 102 and the burner head 103 are made in aluminium alloy (Al-Si and/or Al-Ni) or brass by die-casting and the flat internal element 109 is obtained by drawing a steel, stainless steel, or brass sheet.

Furthermore, the holes 201 of the central flame crown are realized on the peripheral wall of the central chamber 105 and they are tilted with respect to the vertical axis Y of the burner at an angle β of between 40 and 70 degrees.

CLAIMS

1. A burner for cookers, suitable for burning gas, comprising at least two gas crowns, of which one central crown and at least one circumferential crown, a mixing chamber with Venturi effect, ducts for
5 entry of the primary air, and radial ducts for feeding the gas/primary air mixture to the said at least one circumferential crown, characterized in that it comprises a body (2), a head (3) and a separation element (4) which breaks up the internal space into ducts (I) for entry of the primary air and ducts (9; M) for distribution of the
10 gas/primary air mixture.
2. The burner according to Claim 1, in which said separation element is made of steel sheet.
3. The burner according to Claim 1 or Claim 2, in which the top and side walls of said radial ducts (9) are defined in the head (3), and
15 the bottom walls are defined by the upper surface of the separation element (4).
4. The burner according to the any of the preceding claims, in which the body (2) is equipped with ribs (18) that engage with ribs (19) which branch off from the head (3), defining channels
20 communicating with the outside.
5. The burner according to the previous claim, in which the flat element (4) divides into two, in the horizontal direction, said channels communicating with the outside, so breaking up the internal space and defining, at the bottom, said ducts for entry of the primary air (I) and, at the top, said radial ducts (9, M).
25
6. The burner according to any of the preceding claims, in which said ducts for entry of the primary air and said ducts for the distribution of the gas/primary air mixture are four in number, arranged in the form of a cross.

7. The burner according to any of the preceding claims, in which said separation element is shaped like a Celtic cross.
8. The burner according to any of the preceding claims, in which said separation element is joined to the skirt (12).
- 5 9. The burner according to Claim 1 or Claim 2, in which the caps (7) and (8) and the possible skirt (12) are made of steel or brass and are possibly enamelled in different chromatic shades.
- 10 10. The burner according to any of the preceding Claims, characterised in that flame holes (201) of the central flame crown are tilted with respect to the vertical axis (Y) of the burner at an angle in the range of 40 to 70 degrees.

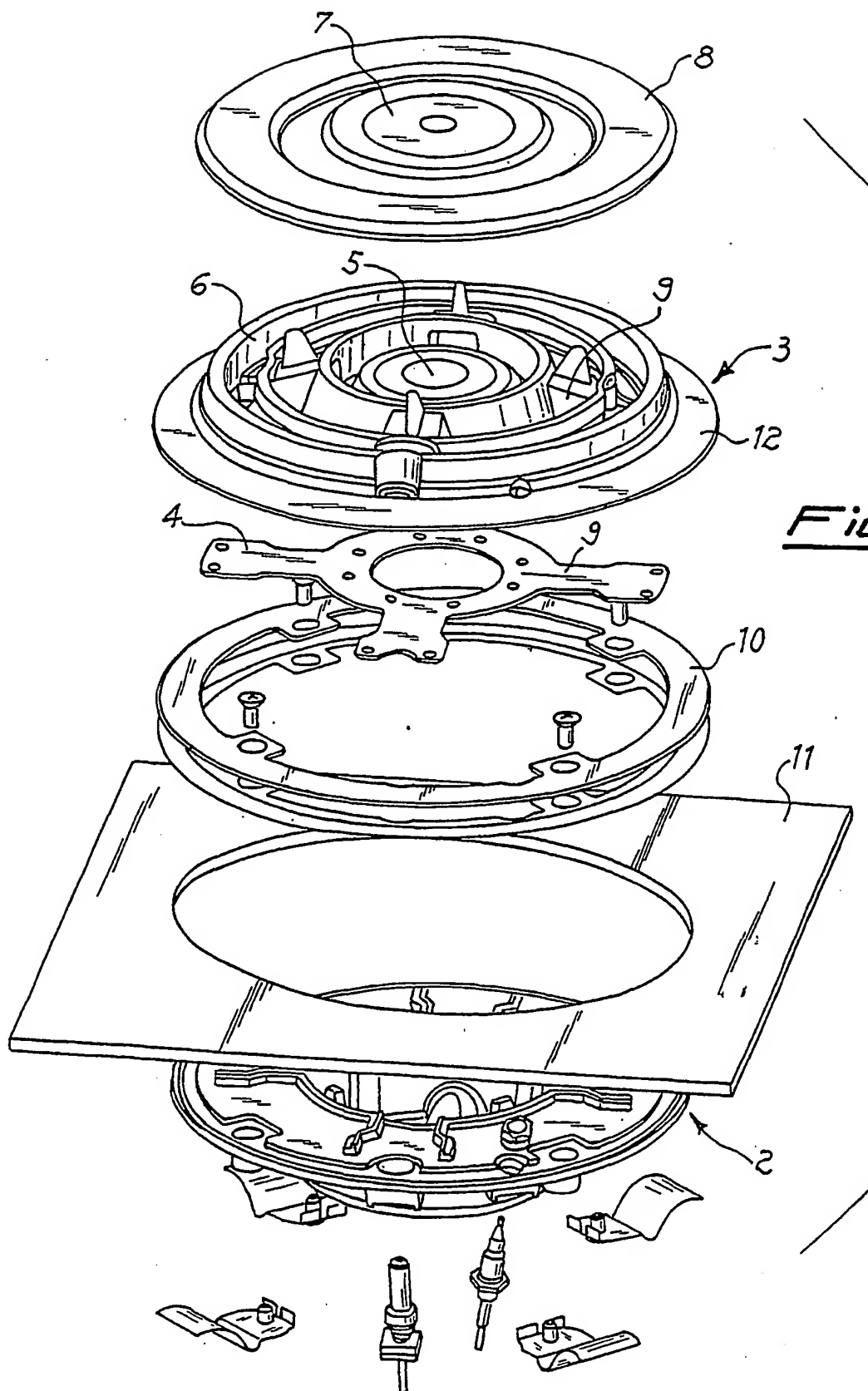


Fig. 1

Fig. 2

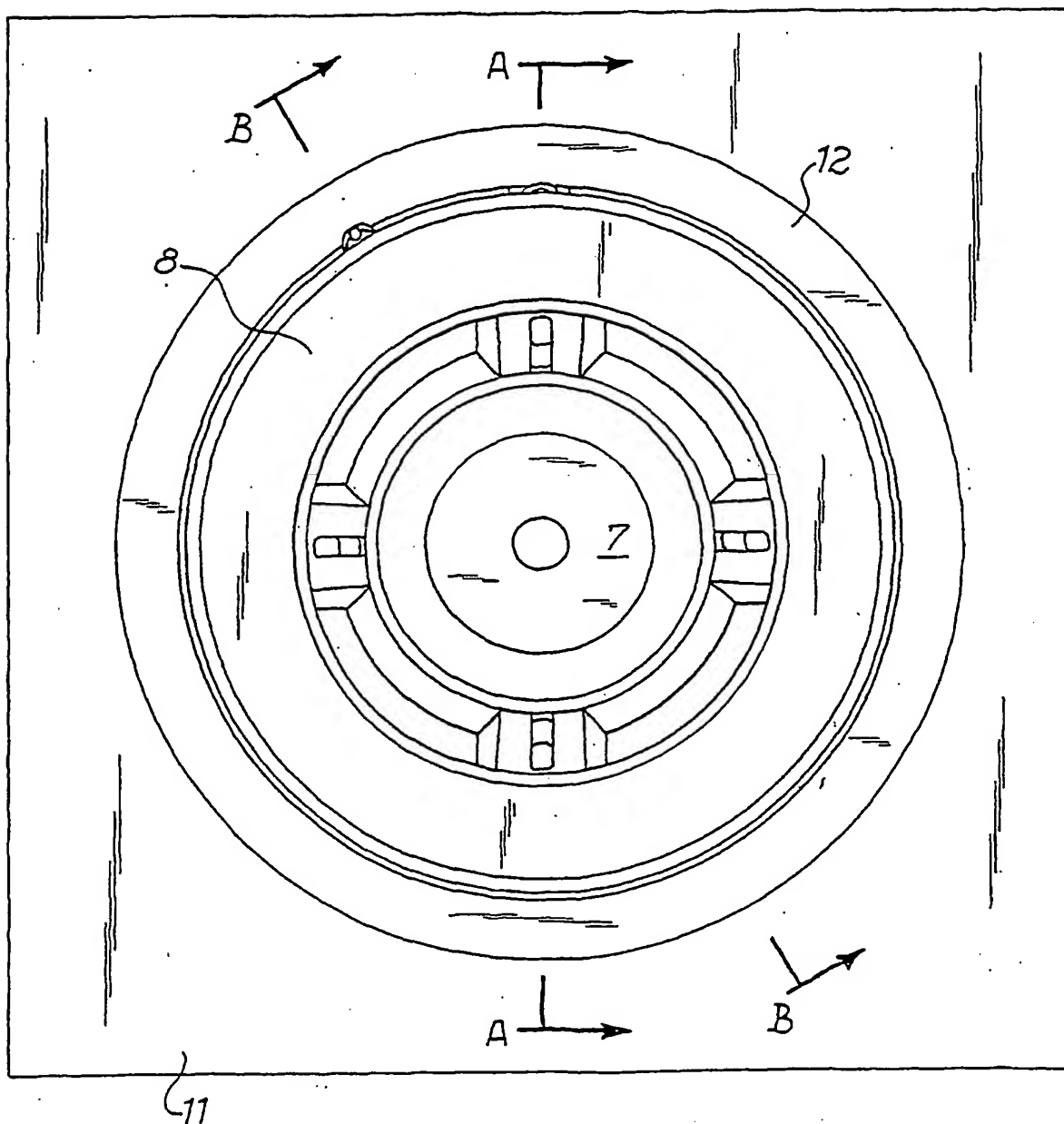


Fig. 3

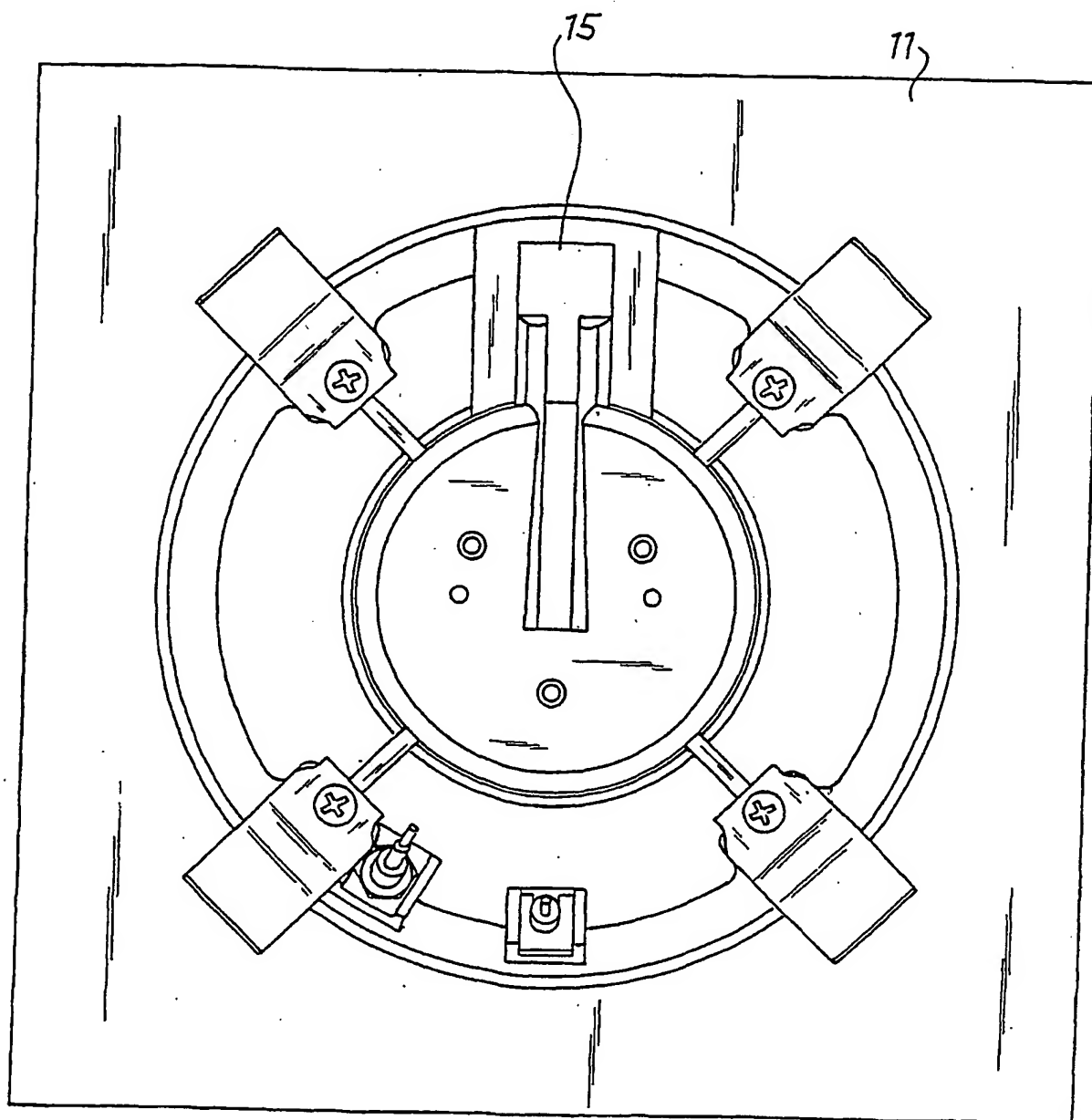
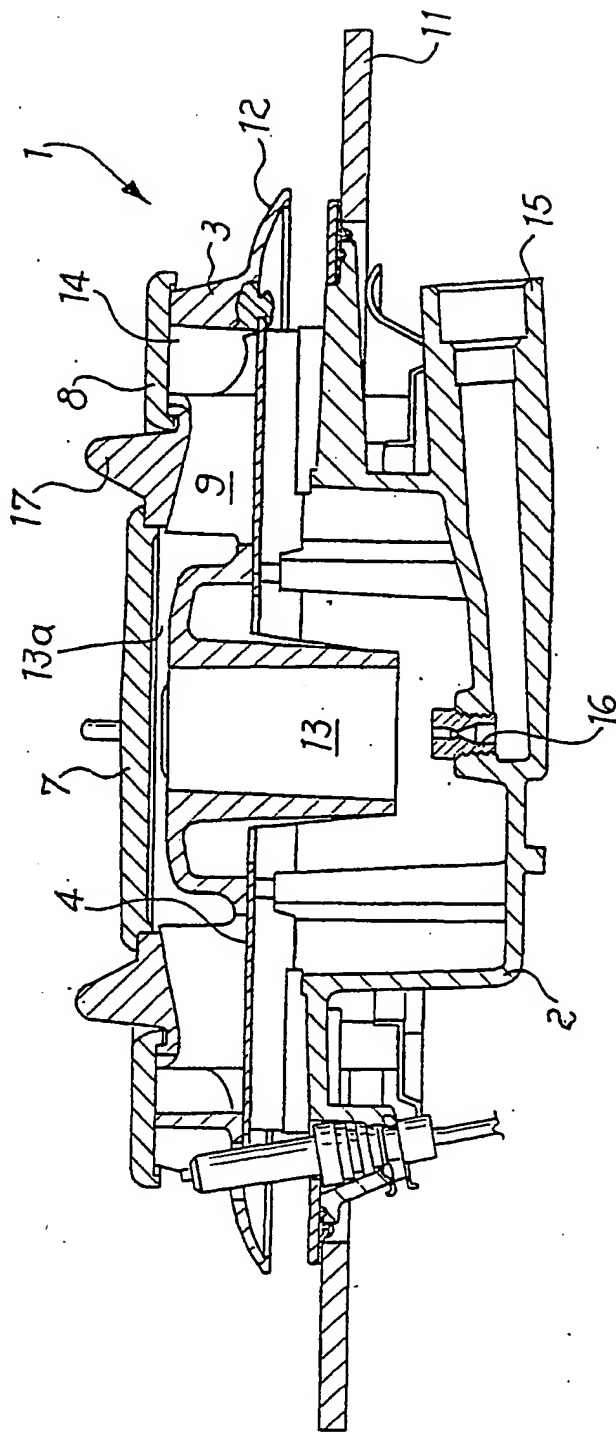


Fig. 4



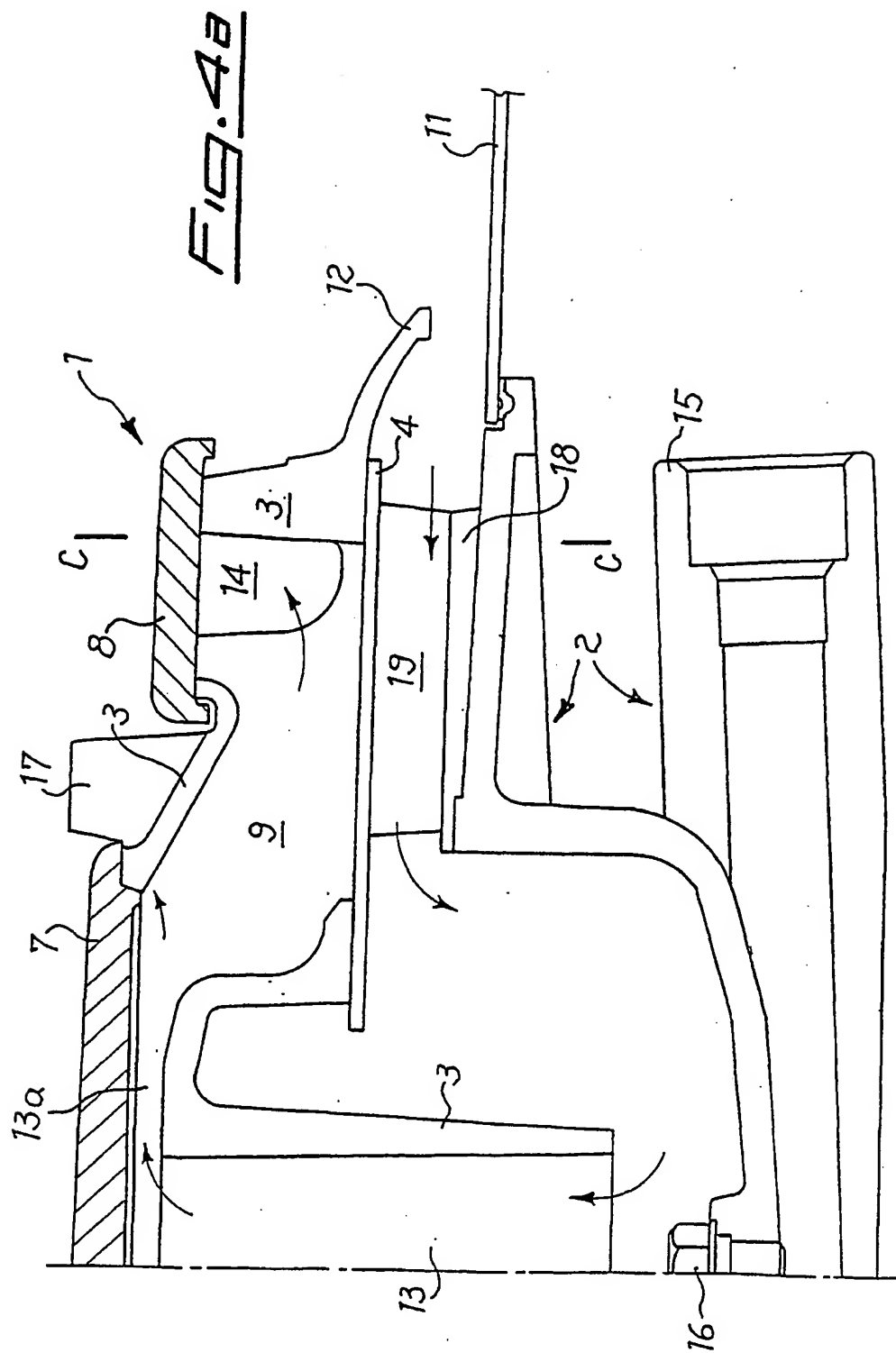


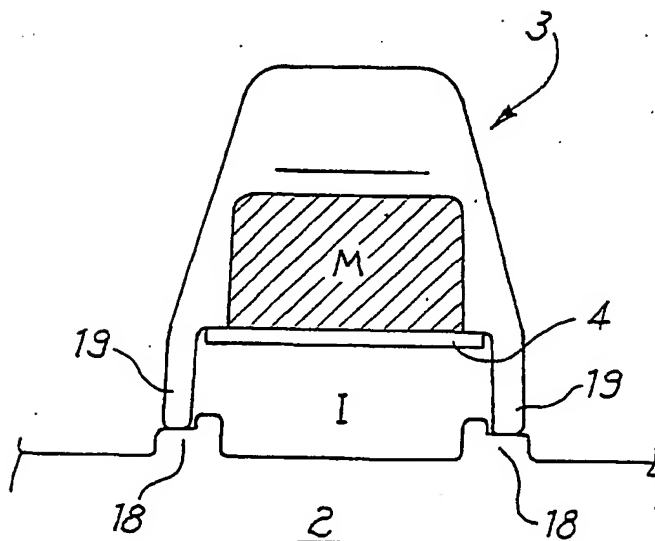
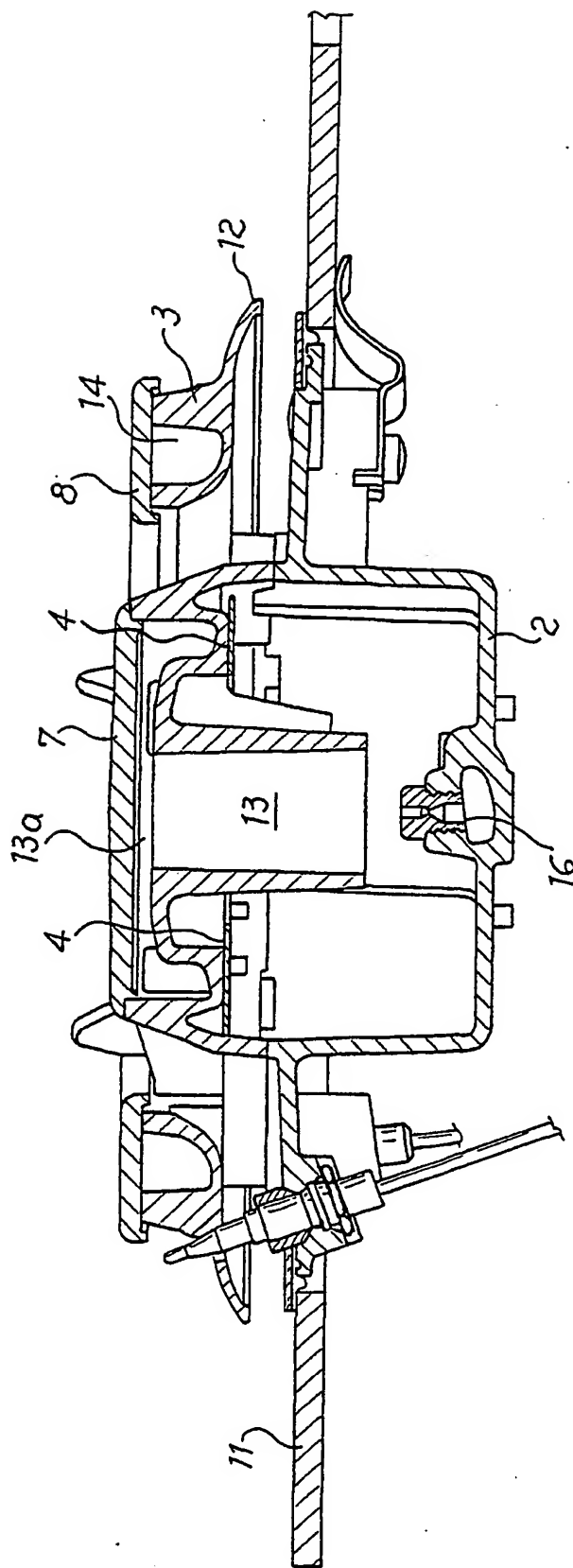
Fig. 5

Fig. 6



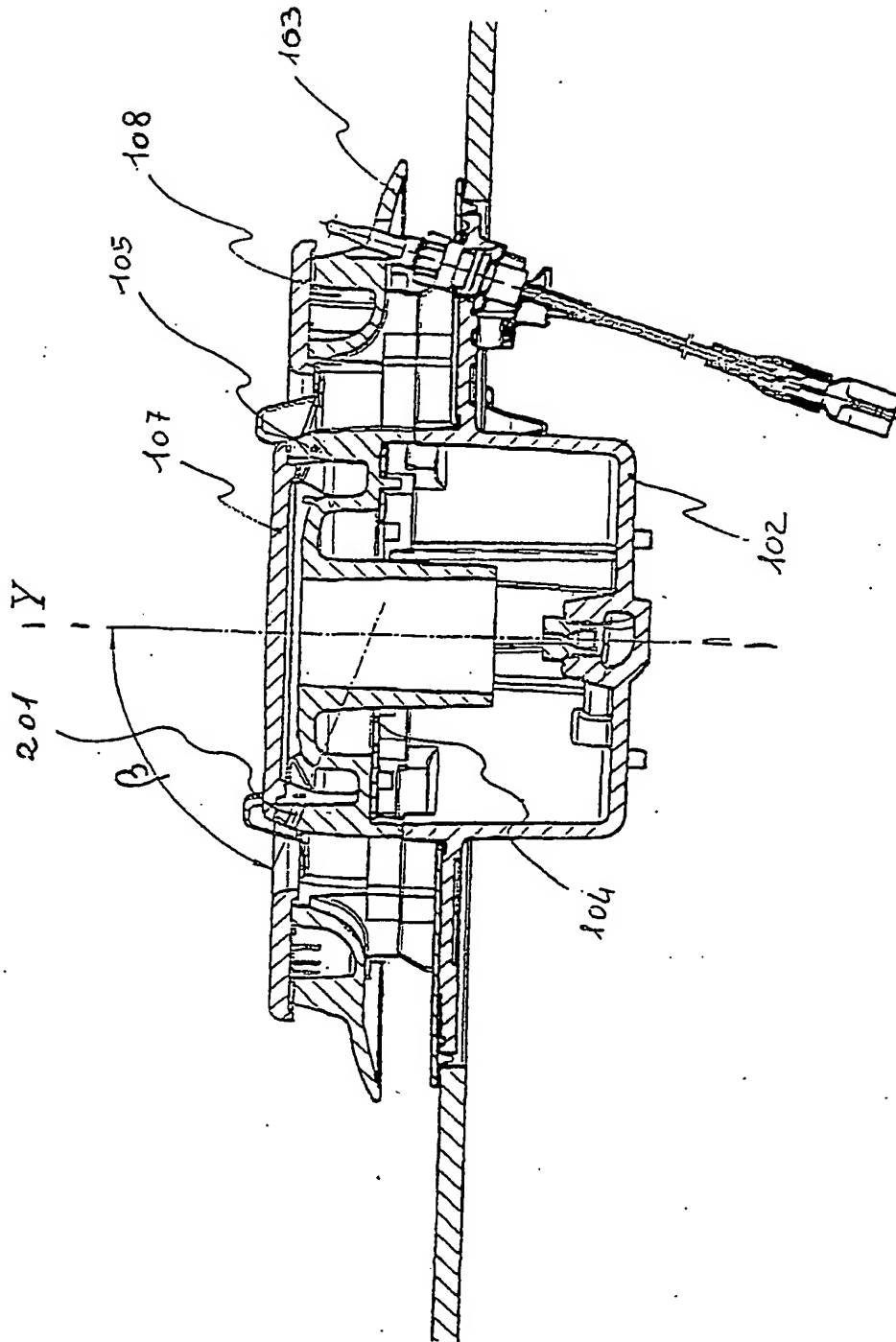


Fig. 7

INTERNATIONAL SEARCH REPORT

International Application No.

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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 F23D14/06 F24C3/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F23D F24C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 797 048 A (SABAF SPA) 24 September 1997 (1997-09-24) cited in the application figures 4,5 column 3, line 3 - line 34	1,3,5-7
Y		8-10
A		4
Y	EP 0.908 682 A (SABAF SPA) 14 April 1999 (1999-04-14) figure 1 column 2, line 57 -column 3, line 22 -/--	8,9

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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INTERNATIONAL SEARCH REPORT

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	PATENT ABSTRACTS OF JAPAN vol. 1999, no. 10, 31 August 1999 (1999-08-31) & JP 11 125405 A (OSAKA GAS CO LTD), 11 May 1999 (1999-05-11) abstract ---	10
A	WO 99 11975 A (ESKILDTSEN CHRISTIAN ;ARMANNI PIERO (IT); ELECTROLUX AB (SE)) 11 March 1999 (1999-03-11) page 2, line 12 - line 32 page 4, line 16 -page 5, line 3 ---	1,2
A	EP 0 634 608 A (DEFENDI OFF MEC SRL) 18 January 1995 (1995-01-18) column 2, line 16 -column 3, line 17 figures 1,4 ---	1,6,7
A	EP 0 903 538 A (SABAF SPA) 24 March 1999 (1999-03-24) cited in the application the whole document ---	1,6,7
A	EP 0 945 679 A (GAZ DE FRANCE) 29 September 1999 (1999-09-29) page 1, line 30 - line 31 -----	9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/IB 01/01053

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0797048	A	24-09-1997	EP 0797048 A1	24-09-1997
			PL 319027 A1	29-09-1997
			SI 797048 T1	31-12-1999
			TR 9700179 A1	21-10-1997
			AT 184384 T	15-09-1999
			DE 69604153 D1	14-10-1999
			DE 69604153 T2	25-05-2000
			DE 797048 T1	12-03-1998
			ES 2107401 T1	01-12-1997
EP 0908682	A	14-04-1999	EP 0908682 A1	14-04-1999
			AU 8709498 A	29-04-1999
			BR 9804172 A	22-05-2001
			CA 2247713 A1	08-04-1999
			PL 329091 A1	12-04-1999
			TR 9802012 A2	21-04-1999
			US 6030207 A	29-02-2000
JP 11125405	A	11-05-1999	NONE	
WO 9911975	A	11-03-1999	WO 9911975 A1	11-03-1999
			AU 3939497 A	22-03-1999
			EP 1025392 A1	09-08-2000
EP 0634608	A	18-01-1995	IT VE930018 A1	16-01-1995
			EP 0634608 A2	18-01-1995
EP 0903538	A	24-03-1999	EP 0903538 A1	24-03-1999
			CA 2245513 A1	23-03-1999
			CN 1212348 A	31-03-1999
			PL 328145 A1	29-03-1999
			TR 9801888 A2	21-04-1999
			US 6035846 A	14-03-2000
EP 0945679	A	29-09-1999	FR 2776753 A1	01-10-1999
			EP 0945679 A1	29-09-1999
			NO 991453 A	27-09-1999
			TR 9900646 A2	21-10-1999
			US 6082994 A	04-07-2000

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